ASSESSMENT OF LONG-TERM DURABILITY OF LEFT SUBCLAVIAN RETROGRADE IN SITU LASER FENESTRATION IN THORACIC ENDOVASCULAR AORTIC REPAIR

EVMS Eastern Virginia Medical School

Will Montgomery, Fletcher Pierce, Jean M. Panneton MD
Division of Vascular Surgery
Eastern Virginia Medical School, Norfolk, VA

Introduction

Retrograde in situ laser fenestration (RISLF) of the left subclavian artery (LSA) has been shown to be a relatively simple and effective intraoperative method for LSA revascularization. However, long-term outcome data for this technique are lacking. This study aims to evaluate long-term outcomes of RISLF of the LSA in zone 2 thoracic endovascular aortic repair (TEVAR).

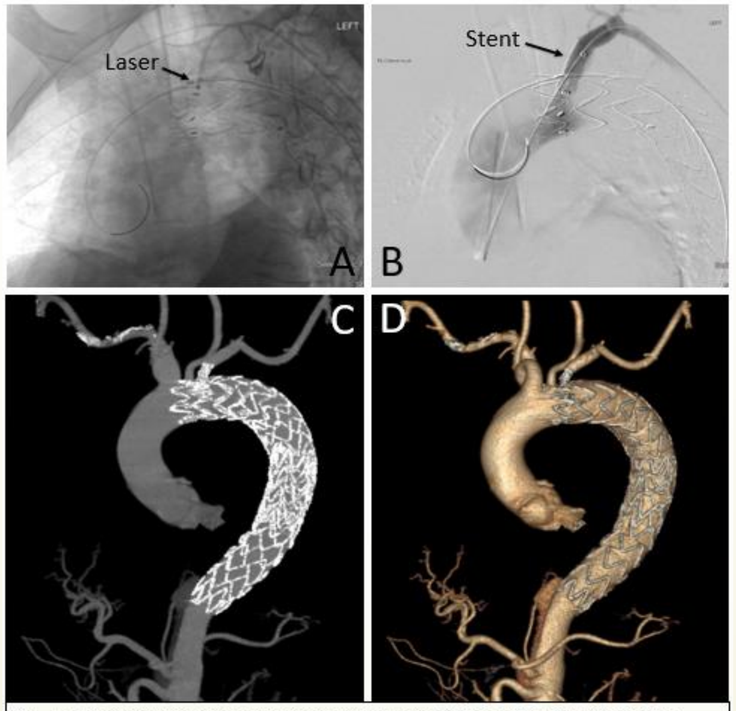

Fig. 1: A: The 2.3mm laser fiber is gently advanced to make contact with the endograft, followed by laser energy application for 3 to 5 seconds to create the fenestration. **B:** The LSA stent is deployed from the brachial access approximately one-quarter into the endograft lumen and three-quarters into the branch vessel. **C, D:** Left subclavian artery (LSA) stent patency and stable aortic size are demonstrated on 12-month follow-up computed tomography angiography and a volume-rendered image.

Methods

A single-center retrospective review of 33 consecutive patients who underwent zone 2 TEVAR with LSA revascularization by RISLF was performed. Indications for this procedure include chronic or acute aortic dissection, aneurysm, penetrating aortic ulcer, and/or intramural hematoma. As this study was designed to evaluate long-term durability of laser fenestration, only patients having undergone LSA revascularization by laser fenestration ≥10 years ago (2009-2013) were included. This surgical technique is illustrated below (**Figure 1**). Postoperative clinical follow-up and computed tomography angiography (CTA) were reviewed to assess late laser fenestration-related morbidity including reintervention, endoleak, stent patency, and mortality.

Results

TEVAR with retrograde laser fenestration of the LSA was performed in 33 total patients (16 males (48%), 17 females (52%), aged 60.0 ±13.0 years). Median operative time was 153 minutes. 30.3% of the patients presented with rupture and 87.9% underwent surgery emergently or urgently. Successful LSA stenting was achieved via retrograde laser fenestration in 100% of cases with no residual type Ic endoleaks immediately postoperatively. Average hospital length of stay was 10.4 ± 9.2 days. Spinal cord injury resulted in 2 patients experiencing transient paraparesis (6.1%) and one permanent paraplegia (3.0%). One patient experienced a major stroke (3.0%). Unfortunately, two patients expired, and two additional patients were lost to follow-up within the first 30 days postoperatively.

Of the patients that maintained follow up to >30 days (n=29), the median clinical follow up interval was 7.4 years (range 0-12.6) and median imaging follow up interval was 7.3 years (range 0-12.5) **(Table 1).** There was only 1 late aortic related mortality. Importantly, there has been no fenestration-related mortality to date as well as no incidences of type IIIc endoleak. Two patients (6.9%) were found to develop late type 1c endoleak and underwent successful distal extension of the LSA stent at 17.3 and 30.2 months postoperatively. CT imaging showed 96.6% rate of stent patency in the late postoperative period with one LSA stent found to be occluded yet asymptomatic 6.1 years after surgery.

Conclusions

- Low fenestration-related complications, stroke rate, and an excellent long-term stent patency rate extending many years postoperatively demonstrate left subclavian retrograde in situ laser fenestration as a durable treatment option for management of aortic pathologies requiring proximal endograft seal in zone 2.
- Short operative time and high technical success rate shows RISLF to be a quick, reproducible method to fenestrate the endograft material effectively in emergent, urgent, and elective settings.

Late Postoperative Outcomes of Zone 2 TEVAR with LSA Revascularization by Retrograde In Situ Laser Fenestration (n=29)

Median Clinical Follow Up	7.4 (range 0-12.6) years
Median Imaging Follow Up	7.3 (range 0-12.5) years
All Cause Mortality	8 (27.6%)
Aorta Related Mortality	1 (3.4%)
Fenestration Related Mortality	0 (0%)
Type Ic Endoleak	2 (6.9%)
Type IIIc Endoleak	0 (0%)
LSA Stent Patency	28 (96.6%)

Table 1: Long-term clinical and imaging follow up intervals show a low rate of aorta or fenestration related mortality. Low rates of fenestration related endoleak (type Ic, type IIIc) and excellent LSA stent patency extending years postoperatively.